National Renewable Energy Laboratory

# Opportunities and Barriers to Distributed Generation

Presenter's Views Only

**Looking to the Future with Distributed Energy Resources**

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This Slide Presentation adopted from materials prepared by Making Connection authors Tom Starrs and Brent Alderfer

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# “Making Connections” Report

- Released May 1, 2000
- Funded by U.S. DOE through the National Renewable Energy Laboratory
- Prepared by Tom Starrs, Brent Alderfer and Monika Eldridge, Gary Nakarado, Technical Monitor
- 90 DG projects were identified; 65 projects surveyed;
  26 projects summarized and included in report
- Projects ranged from 0.3 kW (PV) to 26 MW (gas turbine)
- Available on the Web as PDF file at the following address:
  http://www.eren.doe.gov/distributedpower/barriersreport/

# Summary of Key Issues

- There are real and powerful barriers to distributed generation
  - **Technical requirements for interconnection**
  - **Business practice and contractual requirements.**
  - **Regulatory requirements**
- How to change the perspective of economic regulation (e.g. rates and tariffs) to allow the traditional regulatory system to recognize the potential public benefits associated with the development of viable commercial markets for DR technologies, particularly clean and/or renewable technologies

# Interconnection: Technical Issues

- The Problem:
  - Utilities are responsible for maintaining the safety and reliability of the grid, and have legitimate concerns about the interconnection of equipment to the network.
  - BUT, utilities face a conflict of interest because they have an incentive to discourage self-generation by customers.
- The Solutions:
  - Seek uniform adherence to codes and standards developed by nationally-recognized independent authorities, such as IEEE, UL, and NEC.

# Interconnection: Contractual Issues

- Customers seeking to interconnect a 2 kW PV system or a 10 kW wind turbine may be subject to the same contracting requirements as the developers of 250 MW cogeneration facilities
- There will NEVER be a mass market for small-scale DR facilities if consumers need an attorney and a consulting engineer to negotiate contracts with utilities
- The cost of negotiating and establishing interconnection needs to be commensurate with the size and type of generating facility
- Regulators and legislators recently have started recognizing the need for simplified, standardized contracts for small facilities
- Examples: Insurance, studies, contracts written for 100 MW IPPs

# Contract Terms & Conditions

- Interconnection agreements with distribution utilities may contain restrictive terms and conditions, including:
  - Additional liability insurance requirements
  - Unilateral indemnification requirements
  - Recorded easement requirements
  - Restrictions on transfer or sale
- Distribution utilities may impose fees and charges that reduce or eliminate any incentive for self-generation, including:
  - Engineering review fees
  - Interconnection study fees
  - Additional metering charges and ‘standby’ charges
  - Separate T&D charges billed on a fixed-price basis
  - Competitive transition charges that are non-bypassable

# Regulatory & Utility Practices Discouraging Distributed Generation

- No Access Allowed
  - No Access To Customers (Exclusive Franchise)
  - No Access To Unbundled Distribution
  - No Access To Wholesale Markets (ISO rules)
- Regulatory Incentives Fight The Market
  - DISCO wins by Maximizing Load
  - Discounting Designed To “Protect Against” By-Pass
  - Supplemental, Back-up & Standby Supply Tariffs
  - Buy-Back Rates Arbitrary and Below Market
  - “Departing Load” Fees as CTC
- Interconnection Delay and Expense
  - Case-by-Case Review, Delay, Charges and Technical Requirements
  - Case-by-Case Air Emission Permits

# Tariff Barriers

- Demand Charges
- Back-up tariffs
- Buy-back rates
- Exit Fees
- Uplift tariffs
- ISO--Procedures and Costs

# Fees & Charges: Questions of Scale

- A 2 MW fuel cell operating as baseload generates about 1.46 million kWh per month, worth approximately $73,000 per month assuming it offsets incremental energy costs of $0.05 per kWh
- A 600 Watt solar photovoltaic system generates about 80 kWh per month, worth approximately $5 to $10 per month assuming it offsets retail purchases at $0.06 - $0.12 per kWh
- Which can afford $3,000 in interconnection costs?
- Which can afford $100/kW-yr in standby/backup charges?

NREL

# Example: Effect of Fees and Charges

- From NREL's *Making Connections* Report:
- Farmer in New England seeks to install a 900 Watt PV system, produces about 120 kWh/month worth $200/yr
- Utility requires engineering review fee of $600
- Based on engineering review, utility requires additional protective relays at a cost of $600
- Because the mechanical relays are less sophisticated than the electronic protection built into the inverter, they require calibration, for which the utility charges $125/yr
- Engineering review and relays => $1.33/Watt, one-time
- Calibration fee => 60% of energy savings, recurring

# Report's Ten-Point Action Plan

- Reduce Technical Barriers
  - Adopt uniform technical standard for interconnecting distributed power to the grid
  - Adopt testing and pre-certification procedures for DG equipment
  - Accelerate development of distributed power control technology and systems
- Reduce Business Practice Barriers
  - Adopt standard commercial practices for any required utility review of interconnection
  - Establish standard business terms for interconnection agreements
  - Develop tools for utilities to assess the value and impact of distributed power at any point on the grid

# Ten-Point Action Plan (cont.)

- Reduce Regulatory Barriers
  - Develop new regulatory principles compatible with distributed power choices in both competitive and utility markets
  - Adopt regulatory tariffs and utility incentives to fit the new distributed power model
  - Establish expedited dispute resolution processes for distributed generation project proposals
  - Define the conditions necessary for a right to interconnect

# Discussion Provocations

- For the next few years, distributed generation is about reciprocating engines and big turbines, hopefully in CHP configurations. It is not about fuel cells and microturbines…
- Use of modern rate structures providing customers the information they need to respond to peaks might provide a significant part of the solution.
- Why not integrate, through modern communications and computational power, the supply and demand systems, utilizing the Intelligent Grid™
- Safety and reliability are real issues, but they have solutions. The more difficult barriers are regulatory inertia and “old” paradigm mindsets.

# Issue One

- Can Central Station Model Provide the Reliability Needed by the New Economy?

# Issue Two: Can Traditional Regulatory Institutions Address These Issues?

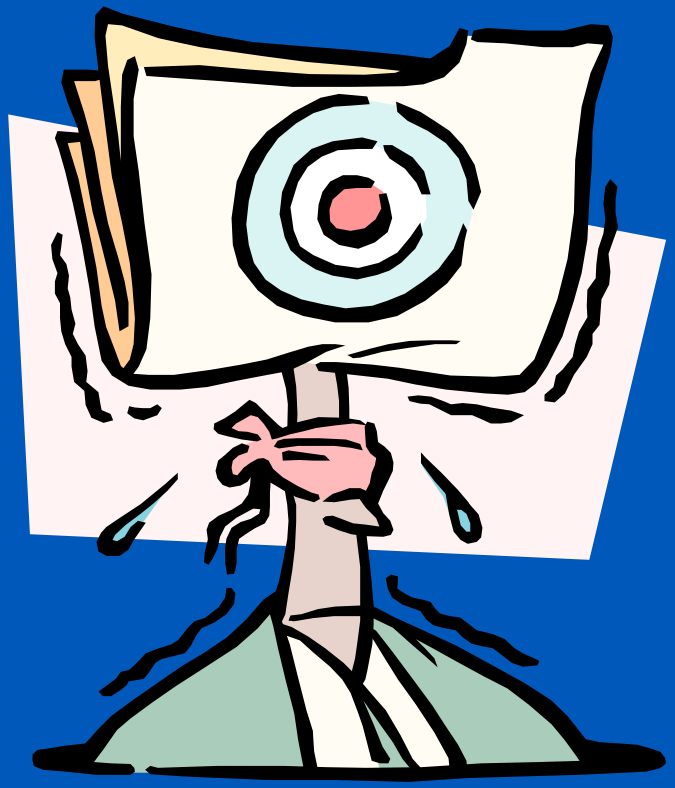
- Despite the apparent "watchdog" or adversarial aspects of public utility regulation, remember, today's monopoly utilities and regulators co-evolved

- Example: economic development rates, backup rates

# Issue Three: Are Interconnection Issues Too Important to be Left to Utilities or ISOs?

- Easy and fair access to the grid, and to retail customers, by distributed energy resources, may be the necessary key to realizing the benefits of competitive markets.

- What are easy and fair terms?



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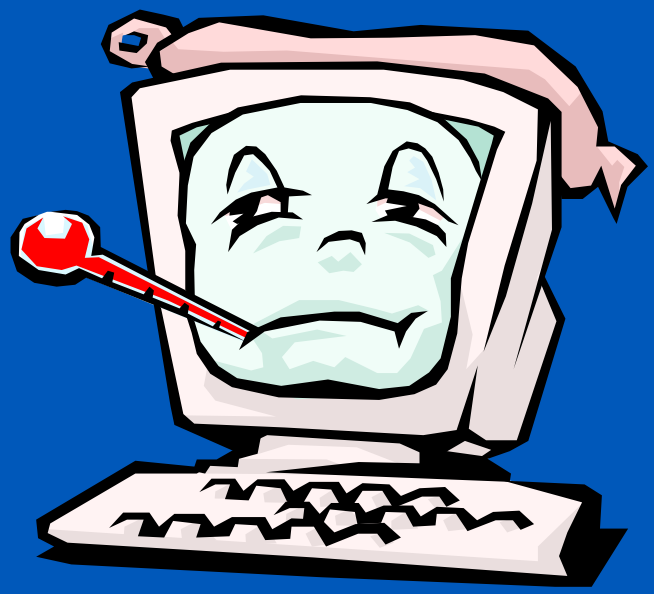
# Worst Case Scenario

- Assume that different distribution configurations are more or less compatible with DG
- Assume that there is a need for a large amount of distribution investment over the next decade
- Is there a strategic market choice available to monopoly distribution companies?



# The End